



February 17, 2012

EX PARTE NOTICE

Electronic Filing

Marlene H. Dortch
445 12th Street, S.W.
Room TW-A325
Washington, DC 20554

Re: WT Docket No. 10-4

Dear Ms. Dortch:

On February 16, 2012, Michiel Lotter, of Nextivity, Inc., Eric Hagerson, of T-Mobile, USA, Inc., and the undersigned met in person with Roger Noel, Joyce Jones and via teleconference with Moslem Sawez and Tom Derenge of the Wireless Telecommunications Bureau, Mobility Division, and David Siehl, in person, of the Public Safety and Homeland Security Bureau, Policy Division.

During the meeting, T-Mobile and Nextivity representatives presented a jointly developed proposal on potential rules governing the consumer use of signal boosters. While again expressing appreciation for the efforts of other parties on this matter, they articulated the belief that their proposal, which is based significantly on existing FCC rules and internationally recognized standards, is well designed to meet the dual goals of improving wireless coverage while ensuring signal boosters operate in a manner that does not cause harm to carrier networks. The attached document outlines the proposal presented by T-Mobile and Nextivity at the meeting.

Although the meeting was focused on the parties' joint work, both T-Mobile and Nextivity expressed a willingness and desire to engage responsible stakeholders in an effort to create a consensus approach on the best way to address carrier concerns while allowing for the use of devices that enhance wireless coverage for consumers.

T-Mobile USA, Inc.
601 Pennsylvania Ave, NW
North Building, Suite 800
Washington, DC 20004

In accordance with the Commission's rules, a copy of this letter and the attachment are being filed electronically in the above-referenced docket.

Sincerely,

A handwritten signature in dark ink, appearing to read "Steve Sharkey", with a stylized flourish at the end.

Steve Sharkey
Chief, Engineering and Technology Policy
T-Mobile, USA

Attachment

CC: Roger Noel
Joyce Jones
David Siehl
Moslem Sawez
Thomas Derenge

WT 10-4

Improving Wireless Coverage Through the Use of Signal Boosters

February 16, 2012

Background

- Proposal Tenets
 - There are consumer and public interest benefits to the use of well designed signal boosters.
 - Signal boosters should operate in a manner that does not harm carrier networks.
 - Rules should be based as much as possible on existing standards work, e.g., ETSI, 3GPP and 3GPP2.
 - Rules should be design agnostic.
- Proposal addresses devices referred to as “consumer boosters.”
 - T-Mobile supports the Verizon-Wilson-VCOMM proposal in regards to the division of signal booster types into three categories.
 - T-Mobile supports the Verizon-Wilson-VCOM proposal’s recommended rules regarding carrier installed and certified engineered and operated booster.

Requirements for Rules

- Authorization
- Registration
- Clearinghouse
- Frequency Coverage
- Frequency Tolerance
- E911
- RF Exposure
- Output Power
- Gain
- Input Intermodulation
- Unwanted Emissions
- Interference Safeguards

Authorization

Importance

Any rules authorizing booster use must protect the rights of incumbent licensees.

Recommendation

FCC proposes to license by rule and classify as a CB service.

Proposal:

- Signal boosters should be licensed consistent with how the Commission authorizes mobile handsets and not by rule.
- The proposed new Part 95 Subpart for this service should not be adopted.
- A new Subpart should be added to Part 20 to govern Signal Booster use on CMRS frequencies.

Registration

Importance

Registering a device with a carrier will allow for frequency, power and location coordination, as well as assist in diagnosing network issues.

Recommendation

FCC does not propose a rule on this.

Proposal:

- In order to operate a signal booster, an operator is required to register said device with the carrier(s) upon whose frequencies the booster is meant to operate.
- Registration will include any necessary frequency, power level and location coordination that may be necessary.

Clearinghouse

Importance

A national clearinghouse will allow carriers to identify problem booster models or environmental conditions and respond accordingly.

Recommendation

FCC does not propose a rule on this.

Proposal:

- National clearinghouse will be repository of information pertaining to authorized and non-compliant signal boosters.
- At minimum, licensees shall send information on non-compliant signal boosters that includes make and model number, location, cause of non-compliance and problem resolution.
- When thresholds are exceeded for either booster model or a particular operating environment, carriers have the right to deny future registrations involving that booster model or use of devices in particular operating environments.

Frequency Coverage

Importance

Because boosters will be frequency and carrier specific, this metric is key in determining which frequency bands a device will cover and under what guidelines it will operate.

Recommendation

FCC current rules adequate with the addition of the following provisions.

Proposal:

- Add a specific reference to the new, proposed Part 20 Subpart requiring that signal boosters be designed to operate only on frequencies assigned to a specific carrier.
- Boosters should be prohibited from working on frequencies assigned to multiple carriers at the same time.

Frequency Tolerance

Importance

Ensures that a signal booster's output is at the correct carrier frequency and does not cause adjacent channel interference.

Recommendation

FCC proposed rules satisfactory (should include PCS and WCS as well as Cellular).

Proposal:

- Cellular: § 22.355 (Frequency Tolerance)
- PCS: §24.235 (Frequency Stability)
- WCS: §27.1101 (Frequency Stability)

E911

Importance

Location accuracy may be adversely affect by the use of a signal booster, especially with network based technologies.

Recommendation

FCC does not propose a rule on this.

Proposal:

- Licensees will not be held liable for E911 location accuracy when those capabilities are affected by signal booster use.

RF Exposure

Importance

Sets safe level of radiofrequency radiation exposure.

Recommendation

FCC proposed rules satisfactory.

Proposal:

- § 2.1091
- § 20.111: “(c) ~~Signal~~ Consumer boosters operated in portable RF exposure conditions as described in Sec. 2.1093 that are designed to be used so that the radiating structure(s) is/are within 20 centimeters of the user or other persons are prohibited.”

Output Power

Importance

Output power limits prevent signal boosters from overpowering other mobiles or base stations and degrading network performance.

Recommendation

FCC proposed rules satisfactory.

Proposal:

- Cellular: § 22.913 (ERP 7 watts)
- PCS: §24.232 (EIRP 2 watts)
- WCS: §27.1101 (EIRP 1 watt)

Gain

Importance

Controlling frequency nonlinearities is essential to controlling spurious emissions.

Recommendation

FCC does not propose a rule on this.

Proposal:

- (a)** The gain of a signal booster shall be set at a level that ensures no material increase in the noise floor at the base station. Specifically, the gain shall be limited to $\text{Gain} \leq \text{MSCL} - 28\text{dB}$ where MSCL is the coupling loss between the booster donor antenna and the base station.
- (b)** In order of preference, MSCL can be determined as follows: (1) measure the actual path loss between the base station and the donor antenna; such measurement shall be based on measuring the received pilot channel power at the booster and reading the actual pilot channel transmit power from the base station as defined in the system information messages sent by the base station, (2) estimate MSCL by assuming that the base station is transmitting at a level of +25dBm per channel (assume a small, lightly loaded cell) and measuring the total RSSI received at the donor antenna. The MSCL is then calculated as 25-RSSI level, or (3) assume that the MSCL is 70dB without performing any measurement. For the cases where the MSCL is based on measurements, the measurement accuracy shall be $\pm 3\text{dB}$.
- (c)** In the case of Mobile boosters, measurements of the MSCL shall be updated at least once per second, else the Mobile Booster shall assume a coupling loss of 70dB.

Input Intermodulation

Importance

Controlling frequency nonlinearities assists in mitigating spurious emissions.

Recommendation

FCC does not propose a rule on this.

Proposal:

(See next page.)

Input Intermodulation

Proposal:

(a) For UTRA, CDMA and E-UTRA operation, the output power of the repeater, when operating at its maximum stated output power, within in the passband of the booster shall not increase by the following amounts when two interfering CW signals at a level of -40dBm are presented at the input to the booster:

- (1)** 10dB, when measured using a 1 MHz Measurement Bandwidth, for UTRA signals with the first interfering signal at 3.5 MHz offset from the center of the first UTRA channel in the passband and the second carrier adjusted in frequency such that the intermodulation product falls at the frequency of the first UTRA channel in the passband.
- (2)** 10dB, when measured using a 1 MHz Measurement Bandwidth, for CDMA signals with the first interfering signal at 1.25 MHz offset from the center of the first CDMA channel in the passband and the second carrier adjusted in frequency such that the intermodulation product falls at the frequency of the first CDMA channel in the passband.
- (3)** 10dB, when measured using a 1 MHz Measurement Bandwidth , for E-UTRA signals with the first interfering signal at 1.0 MHz offset from the edge of the first and last E-UTRA channel in the passband and the second carrier adjusted in frequency such that the intermodulation product falls at the frequency of the first and last E-UTRA channel in the passband.

(b) For GSM operation with the booster set to maximum gain, the average power level of any intermodulation product of two CW tones spaced by 600 kHz and with levels as needed to achieve the maximum rated output power of the booster and centered in the passband of the booster, at the output of the booster shall be limited as follows:

- (1)** -36dBm in the frequency band 9 kHz to 1 GHz and -30dBm in the frequency band 1 GHz to 12.75 GHz when measured with a 3 kHz measurement bandwidth.

Unwanted Emissions

Importance

Limitation of signal booster unwanted emissions is essential to preventing harmful interference, both within and outside the authorized operating frequency region of the device.

Recommendation

FCC proposes to use existing rules: §22.917, §22.359, §24.238 and §27.53

Proposal:

(See next page.)

Unwanted Emissions

Proposal:

Booster Frequency Band of Operation	Technology	Out-of-band Emission Limit Requirement Reference (Includes Operating Band Unwanted Emissions if Applicable)	Spurious Emissions Limits Requirement Reference
Cellular	-	47 CFR §22.917(e), §22.901(d)(2)	47 CFR §2.1051, §2.1053, §2.1057
PCS*	UTRA CDMA	ETSI TS25.143 v6.7, Section 9.1.1.2 3GPP2 C.S0051.0 Section 3.6	ETSI TS25.143 v6.7, Section 9.2 3GPP2 C.S00510.0, Section 3.6
AWS**	UTRA CDMA	ETSI TS25.143 v6.7, Section 9.1.1.2 3GPP2 C.S0051.0 Section 3.6	ETSI TS25.143 v6.7, Section 9.2 3GPP2 C.S00510.0, Section 3.6
698-746 MHz 746-758 MHz 776-788 MHz**	E-UTRA	ETSI TS136.106 V8.0.0 Section 9.1	ETSI TS136.106 V8.0.0 Section 9.2

Out-of-Band and Spurious Emission limits are intended to apply to both the downlink (base to handset) and uplink (handset to base) transmission paths.

*For PCS, the Out-of Band and Spurious Emission limits should additionally meet the limits specified in 47 CFR §24.238, §2.1051, §2.1051 and §2.1057.

**For AWS and 698-746 MHz, 746-758 MHz and 776-788 MHz, the Out-of-Band and Spurious Emission limits should additionally meet the limits specified in §27.53(c), §27.53(f), §27.53(g), §27.53(h), §2.1051, §2.1053 and §2.1057.

Interference Safeguards

Importance

Prevents both in-network and adjacent network interference and network degradation.

Recommendation

FCC proposed rules partially satisfactory.

Proposal:

- Modify §95.1623(a) to say “Signal boosters must automatically self-monitor their operation to ensure compliance with all applicable technical standards and either self-correct or shut down automatically within ~~10 seconds (or less)~~ no more than 2 milliseconds if their operation exceeds any of those parameters.”
- Modify §95.1623(b) to say “Signal boosters must be able to detect feedback or oscillation (such as may result from insufficient isolation between the antennas) and either self-correct or deactivate the uplink transmitter within ~~10 seconds~~ no more than 2 milliseconds of detection.”
- Add clause: “*Remote shutdown*. Carriers on whose frequencies a signal booster is operating should be able to shut down the device remotely if it is suspected the booster may be causing harm to the network or adjacent networks.”
- Add clause: “*Uplink mute*. Signal boosters should mute uplink transmission during periods of no user traffic.”
- Consumer Boosters must be designed so consumers can not readily modify the operating parameters of the device.

Further Questions or Comments